

REMARKS

Claims 18-35 are pending in the above-identified application.

In the Office Action, claims 18-35 were rejected.

With this Amendment, claim 24 is amended to correct a minor typographical informality.

Accordingly, claims 18-35 remain at issue.

I. 35 U.S.C. § 103 Obviousness Rejection of Claims

Claims 18-35 were rejected under 35 U.S.C. § 103(a) as being purportedly unpatentable over *Hokari et al.* (US 2003/0168381) in view of *Wright et al.* (US 5,141,823).

With respect to independent claim 18 as amended and referencing Fig. 1 for illustrative purposes, Applicants claim a system 50 for reforming diesel fuel into hydrogen. The system 50 includes, in relevant part, feeds 103 and 105 for water and diesel fuel, a supercritical water (SCW) reactor 201 in fluid communication with the water feed 103 and the diesel fuel 105, at least one pre-heater 107 in thermal communication with the water feed 103 and the diesel fuel 105, a water-gas shift (WGS) reactor 301, and a hydrogen capturing system 405. The at least one pre-heater 107 is configured to heat water from the water feed 103 and diesel fuel from the diesel fuel feed 105 to a predetermined temperature equal to or greater than the critical temperature of water. Water and diesel fuel are fed by the respective feeds 103 and 105 to the SCW reactor 201 at the predetermined temperature via the at least one pre-heater 107. The SCW reactor 201 is adapted to place the pre-heated water into a supercritical state within the SCW reactor 201. The SCW reactor 201 reforms the diesel fuel into a synthesis gas comprising a mixture of hydrogen and carbon monoxide and outputs the synthesis gas. The synthesis gas output by the

SCW reactor 201 is fed into the WGS reactor 301 which converts the carbon monoxide of the synthesis gas into carbon dioxide and hydrogen and outputs an output gas including a higher percentage of hydrogen to carbon monoxide compared to the synthesis gas. The hydrogen in the output gas is captured by the hydrogen capturing system 405.

In the Office Action of April 22, 2009, the Examiner re-tracks a prior admission made in an Office Action dated September 30, 2008 (see page 6, lines 16-18) that *Hokari* fails to disclose the presence of at least one pre-heater in thermal communication with said fuel feed and configured to preheat fuel to a predetermined temperature equal to or greater than the critical temperature of water. Instead, the Examiner now asserts that *Hokari* teaches having a fuel pre-heater where fuel 3 is purportedly preheated in the mixer 1 to a predetermined temperature equal to or greater than the critical temperature of water once the fuel feed gets in direct contact and mixes with the supercritical water from the water supply pipe 2 before entering the reactor 5.

Applicants respectfully disagree. Applicants submit that *Hokari* teaches preheating water (via a heat exchanger 25) that is supplied via pipe 2 to the mixer 1. Applicants submit that mixing preheated water with fuel that is not preheated in mixer 1 lowers the temperature of the water by transferring heat to the fuel but does not (based on the law of energy conservation) preheat the fuel to “a predetermined temperature equal to or greater than the critical temperature of water” as required by claim 18. In fact, nowhere does *Hokari* teach or fairly suggest “at least one pre-heater in thermal communication with said water feed and said diesel fuel and configured to heat water from said water feed AND diesel fuel from said diesel fuel feed to a predetermined temperature equal to or greater than the critical temperature of water.” As the Applicant’s specification discloses, by pre-heating the water and the fuel via pre-heaters 107 in

Fig. 1 to a temperature at or above the critical temperature of water, the SCWR operates in a more efficient manner while also placing less of a requirement on the SCWR resulting in faster production of hydrogen. See, Original Application, at pg. 11, line 20 to pg. 12, line 2.

As previously asserted by the Applicants in response to the Office Action dated September 30, 2008, *Wright* also fails to teach these limitations missing from *Hokari*. *Wright* discloses three heat exchangers which are used to preheat a fuel and water mixture. However, the heat exchangers in *Wright* are effective to heat the fuel and water mixture to only 80% of the temperature required for a reaction. See, U.S. Pat. No. 5,141,823, Col. 7, l. 29-34. This is clearly unlike the claimed invention which pre-heats fuel and water feeds to greater than or equal to the critical temperature of water. Under *Wright*, the temperature of the fuel and water mixture would only be heated to 80% of the required temperature for reaction, the critical temperature of water in the claimed invention, which does not provide the same benefits of the claimed invention.

Accordingly, Applicants submit that *Hokari* and *Wright* (alone or in combination) fail to teach or suggest all of the limitations of claim 18, and respectfully request that the rejection of claim 18 be withdrawn.

Independent claims 26 and 27 have water and fuel preheating and SCW reactor requirements (as well as other limitations) similar to claim 18. Thus, claims 26 and 27 should be deemed allowable for at least the same reasons as claim 18.

Claims 19-25 depend, directly or indirectly, from claim 18 and, thus, should be deemed allowable for at least the same reasons as provided for claim 18.

Claims 28-35 depend, directly or indirectly, from claim 27 and, thus, should be deemed allowable for at least the same reasons as provided for claim 27.

II. Conclusion

In view of the above amendments and remarks, Applicant submits that claims 18-35 are clearly allowable over the cited prior art, and respectfully requests early and favorable notification to that effect.

The Commissioner is hereby authorized to charge any additional fees which may be required, to Account No. 19-3140.

Respectfully submitted,

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